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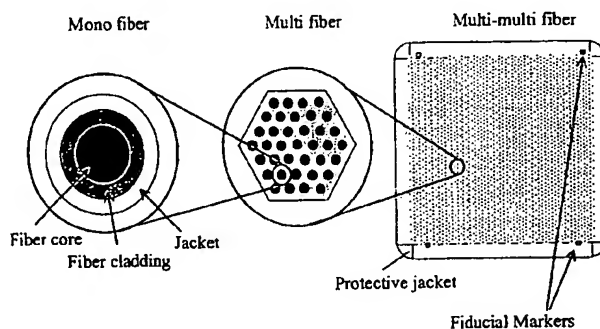
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[Continued on next page]

(54) Title: **ARRAYS COMPRISING A FIDUCIAL AND AUTOMATED INFORMATION PROCESSING IN RANDOMLY ORDERED ARRAYS**

Fiber Optic Bundle



(57) Abstract: The present invention provides array compositions comprising a substrate with a surface comprising discrete sites, at least one fiducial, and a population of microspheres comprising at least a first and a second subpopulation, each comprising a bioactive agent, and distributed on said surface. Each subpopulation may optionally comprise a unique optical signature, an identifier binding ligand, or both. The invention further provides compositions comprising a computer readable memory, comprising data acquisition, registration, and comparison modules to direct a computer to function in a specified manner. The registration module may utilize any number of fiducials, including a fiducial fiber, a fiducial microsphere, or a fiducial template generated from the random array. In further aspects, the invention provided methods of making the array compositions of the invention, for comparing separate data images of a random array, for decoding a random array composition, and for determining the presence of a target analyte in a sample.

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INTERNATIONAL SEARCH REPORT

International Application No
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| | | |
|---|---|--|
| A. CLASSIFICATION OF SUBJECT MATTER IPC 7 B01J19/00 G01N21/77 G01N21/64 G06T7/00 | | |
| According to International Patent Classification (IPC) or to both national classification and IPC | | |
| B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) IPC 7 B01J G01N | | |
| Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched | | |
| Electronic data base consulted during the international search (name of data base and, where practical, search terms used) | | |
| C. DOCUMENTS CONSIDERED TO BE RELEVANT | | |
| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
| X | US 5 840 256 A (ROBERT RICHARD DEMERS ET AL.) 24 November 1998 (1998-11-24) abstract column 1, line 3 - line 12 column 1, line 24 - line 32 column 4, line 11 - line 13 column 7, line 9 - line 33 column 8, line 21 - line 25 figures 3,5 | 1,7,18, 24 |
| Y | | 2,3,9, 10,19, 20,26,27 32,38 |
| A | --- | -/-- |
| <input checked="" type="checkbox"/> Further documents are listed in the continuation of box C. <input checked="" type="checkbox"/> Patent family members are listed in annex. | | |
| * Special categories of cited documents : "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. "&" document member of the same patent family | | |
| Date of the actual completion of the international search 23 June 2000 | | Date of mailing of the international search report 13. 10. 2000 |
| Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016 | | Authorized officer STEVNSBORG, N |

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International Application No

PCT/US 00/03375

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
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| Y | ANTHONY W. CZARNIK: "Illuminating the SNP - genomic code" MODERN DRUG DISCOVERY, vol. 1, no. 2, November 1998 (1998-11) - December 1998 (1998-12), pages 49-55, XP000920564 US page 50 -page 54 figures 2,3 | 2,3,9, 10,19, 20,26,27 |
| A | | 1,4-8, 18, 21-25, 32-43 |
| X | WO 96 03212 A (SYDNEY BRENNER) 8 February 1996 (1996-02-08) abstract page 3, line 19 - line 24 page 4, line 21 - line 22 page 5, line 9 - line 11 page 9, line 9 - line 12 page 10, line 28 - line 31 page 11, line 23 - line 34 figures | 1,9,10, 18,26,27 |
| X | US 5 854 684 A (PAUL J. STABILE ET AL.) 29 December 1998 (1998-12-29) abstract column 3, line 22 - line 60 column 8, line 18 - line 37 column 13, line 4 - line 43 column 15, line 32 -column 16, line 42 figures | 1,7,18, 24 |
| A | | 2,3,9, 10,19, 20,26, 27,32, 36-39, 42,43 |
| A | DAVID R. WALT: "Fiber Optic Imaging Sensors" ACCOUNTS OF CHEMICAL RESEARCH., vol. 31, no. 5, 1998, pages 267-278, XP002140931 AMERICAN CHEMICAL SOCIETY. WASHINGTON., US ISSN: 0001-4842 the whole document | 1-10, 18-27, 32-42 |

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 00/03375

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|------------|--|--|
| P,X | <p>WO 99 60170 A (HYSEQ, INC.) 25 November 1999 (1999-11-25)</p> <p>abstract page 6, line 28 -page 8, line 2 page 9, line 11 -page 10, line 21 page 15, line 1 - line 23 page 18, line 9 - line 21 page 19, line 23 -page 20, line 7 page 21, line 6 -page 22, line 20 page 23, line 1 - line 13 figures</p> | <p>1-3, 8-10, 18-20, 25-27</p> |
| A | <p>WO 98 40726 A (TRUSTEES OF TUFTS COLLEGE) 17 September 1998 (1998-09-17)</p> <p>the whole document</p> | <p>1-10, 18-27, 32-42</p> |

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 00/03375

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
1-10; 11, 12 (in part); 18-27; 32-42 (in part)

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

1. Claims: 1-10; 11, 12 (in part); 18-27; 32-42 (in part)

insofar as they relate to arrays of microspheres with a bioactive agent comprising at least two subpopulations on a substrate with discrete sites and a fiducial.

2. Claims: 11, 12 (in part); 13-17; 28-31; 32-42 (in part)

insofar as they relate to a computer system for comparing data images and method for comparing data images using the computer system.

3. Claims: 32-37 (in part)

insofar as they relate to decoding arrays of microspheres with a bioactive agent comprising at least two subpopulations on a substrate with discrete sites and a fiducial by comparing data images using a computer system.

4. Claims: 38-43 (in part)

insofar as they relate to determining the presence or absence of a target analyte in a sample by the use of arrays of microspheres with a bioactive agent comprising at least two subpopulations on a substrate with discrete sites by comparing data images using a computer system.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 00/03375

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